

REMARKS

Claims 2-6 are pending in this application. By this Amendment, claims 2-6 are added to overcome the rejection under 35 U.S.C. §103(a), and claim 1 is canceled. Support for new claims 2-6 may be found at, for example, the fourth paragraph, the fifth paragraph, and in Examples 1, 2 and 3 in the specification. No new matter is added by this Amendment.

I. Rejection under 35 U.S.C. §103(a)

Claim 1 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,702,540 ("Kubota") in view of U.S. Patent No. 4,191,599 ("Stickels"). This rejection is respectfully traversed.

The Patent Office alleges that it would have been obvious to one of ordinary skill in the art to have selected a pressure range within the disclosed pressure range of Kubota "because Kubota discloses the same utility over the entire disclosed range." See Office Action, page 2. Applicants respectfully disagree.

First, regarding Kubota and Stickels, one of ordinary skill in the art would not have been led by Kubota and Stickels to the claimed subject matter, as alleged by the Patent Office. For example, claim 2 requires the active nitrogen carrier (e.g., ammonia) to be introduced into the vacuum furnace chamber during the preheating of the charge after the charge reaches at least 400 °C until the charge reaches the carburizing temperature. This preheating stage, where the surface area of the charge is saturated with nitrogen, restrains the growth of austenite grains without forming nitride's on the charge's surface. See page 2 of the specification and Examples 1, 2, and 3. Once the carburizing temperature is reached, the active nitrogen carrier gas introduction is stopped and the carbon carrier introduction is begun.

Kubota only suggests that a vacuum carburizing method could be applied to carbonitriding treatment, in which the active nitrogen carrier penetrates the surface of the

steel material at the same time as the carburizing gas. See Kubota, column 3. Nowhere does Kubota teach or suggest introducing an active nitrogen carrier only when the temperature is between 400 °C and the carburizing temperature. Kubota also fails to teach or suggest stopping nitrogen carrier introduction when the carburizing temperature is reached and thereafter introducing only the carbon carrier. In fact, Kubota teaches against this latter step, desiring the introduction of the nitrogen carrier and the carbon carrier together to effect carbonitriding.

The Patent Office alleges that Stickels discloses that nitrogen is a result-effective variable because it directly affects nitrogen content, nitrogen penetration depth, and resulting residual stress on the steel's surface. See Office Action page 3. However, even if accepted as accurate, such facts would not remedy any of the above deficiencies of Kubota.

As such, Kubota and Stickels, alone or in combination, would not have directed one of the ordinary skill in the art to continuously introduce an active nitrogen carrier during preheating from a temperature at 400°C to a carburizing temperature. Further, Kubota and Stickels, alone or in combination, do not teach or suggest shutting off the active nitrogen carrier and introducing the carbon carrier when the vacuum furnace chamber and the charge reach the carburizing temperature.

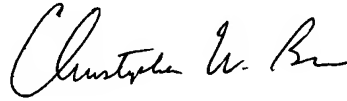
For the foregoing reasons, Applicants submit that Kubota and Stickels, alone or in combination, do not teach or suggest all of the features recited in claims 2-6. Reconsideration and withdrawal of the rejection are thus respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 2-6 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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